

AVIATION WEEK

AUG. 1, 1949

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For full information and recommendations on complete Roebbing Lock-Chid Control Cable assemblies, contact our Engineering Department, John A. Roebbing's Sons Company, Weston, N. J.

ROEBLING
A COMMITMENT OF CONFIDENCE

Vol. 33, No. 5

AVIATION WEEK

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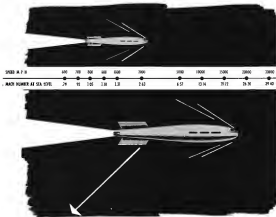
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NATIONAL AIR RACES

CLEVELAND, SEPTEMBER 3, 4, 5



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TEXACO Lubricants and Fuels
FOR THE AVIATION INDUSTRY

Fighter Refueling

USA's air forces show the use of aerial refueling as a quick extension of jet fighter range. Initial experiments have been made with the Boeing B-50 Superfortress refueling equipment (Aerospace Warfare, Feb. 14, p. 12), and operational procedures will probably be worked out for the North American F-86 F-99 series which have an extremely short range at present, late model Republic F-84s which will be used primarily for ground support operations, and the Lockheed F-99 prototype fighter.

USA's experts on aerial refueling are the only experts available in the immediate future to provide counsel for modern and light bombers. Meanwhile, Britain's Royal Air Force has shown little interest in the project despite a demonstration by Sir Alan Cockburn's Flight School in 1944. In which a two-seat Gloster Meteor was refueled in the air from a Lancaster tanker. RAF joined the request for the demonstration.

Job at Landis

Washington hubbub over the "five percent" rule also has its influence to get government contracts for aircraft has brought a demand for increasing staff of former leaders of high-level jobs who now represent private interests before the agencies with which they were once associated. Sen. Hugh B. White (R., Ark.) selected former CAA Chairman James M. Landis as his list of officials whose such an inquiry should cover.

Annually, Landis' biggest job was having CAA's been his first legal representation of American District Attorney employees who are fighting the proposed rule of ADA to Pen American Airways. Landis' partner in the Washington law firm of Landis, Green, and Mader also held important CAA posts. L. Lewis Pigeon, CAA chairman before Landis, is a Washington attorney representing airline interests.

NACA Protest

National Advisory Committee for Aeronautics has vigorously protested its incorporation in the Commerce Department, announced by the Hoover Commission. The Commission's proposal was that Commerce be reorganized into two divisions—a transportation service and an industrial and commercial service. Under the transportation

service would be bureau for the aircraft, marine, civil aviation, high speed transportation, railroad transportation, and to navigation, and a bureau for weather.

Civil Aviation Bureau would take over all the current activities of Civil Aeronautics Administration, National Advisory Committee for Aeronautics, and its newly enhanced functions of Civil Aeronautics Board. In a letter to Chairman John McClellan (D., Ark.) of the Senate Committee on Transportation and Commerce, Department, NACA argued that "its status as an independent agency" be concerned. Commerce Department, it is understood, is opposed to taking over activities of the NACA.

If and when the President submits the Commerce reorganization plan to Congress, it will take a constitutional aspect of either House to veto it.

Center Site

Leading contender for location of a \$1 billion Air Force "air engineering development center" is southern Nevada near Las Vegas. USAF engineers completed a survey of the location recently. Other top contenders for the center are an area in eastern Washington and the Tennessee Valley system. USAF now is evaluating reports on the three areas.

Legislation authorizing \$850 million to initiate construction of the center has been approved by the Senate Armed Services Committee. If the authorizing legislation is approved this session, USAF plans to expend \$50 million out of its development fund for development of the center over the 1950 fiscal year.

Symington's Future

Captain H.H. Symington won't be reappointed as Air Force Secretary W. Stuart Symington makes a bid for the Democratic nomination in the Missouri Senate race scheduled for 1950. Miss-

ouri's two Republican Senators—Farrington Davis and James P. McKittrick—have been a strong force in the sale of the Truman Administration. Davis is up for reelection in 1950 and McKittrick Thomas is anxious to put a strong candidate in the field against him in the next year of the president's local political prodigy Symington's legal residence is still St. Louis, Mo.

O'Connell Protest

CAR Chairman Joseph O'Connell's protest against legislation requiring that all future air agreements take the form of treaties, subject to Senate ratification, has had little effect in Capitol Hill.

O'Connell declared that opposition to a based primarily upon the practical consideration that is affecting outages of operating rights the time element involved in the ratification process.

"To prohibit consummation of all international aviation agreements until ratified as treaties would seriously impede international aviation, and would place the U. S. in a disadvantageous position in international bargaining, but acquired rights. This is particularly true in instances requiring prompt action in which ... representatives of foreign governments may be empowered to take direct action without such restrictions."

Chairman Edwin Johnson (D., Colo.), of the Senate Interstate and Commerce Committee and Aviation Committee, O'Connell's protest, he and members of his committee plan to push for Senate passage of the legislation at this session.

Bigger They Are

CAA's growing tendency to ignore the small commercial aspects, in favor of the big money commercial fields was pointed up sharply again last week in opposition of a 1.6 million airport advisory committee, all were municipal airport managers, without one field-line operator included.

A CAA spokesman advised American Western that a California representative airport operator had been asked to serve but had turned it down on account of expense. Apparently the invitation was not extended to other field-line operators close to Washington. It is indicated that the oversight will probably be remedied by appointment of one or more commercial field operators when the expansion of the first one-year term occurs.

Fairchild Board

USAF's Fairchild Board is meeting again in the Pentagon. Aircraft manufacturers are now busy paying the mounting for possible shifts in USAF fiscal 1950 procurement programs. One subject on the Board's agenda is delivery of transport requirements.

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AVIATION CALENDAR

Aug. 1-10am, Copeland Aircraft Co. at Air, Hotel Statler, Washington, D. C.

Aug. 6-7-Seventh annual International Air Fair sponsored by Aero Club of Madison, White Run, Japan

Aug. 6-14-1949 West Coast meeting close jumping, Portland, Oregon, Calif.

Aug. 7-14-Spread aerial conferences, insurance congress, NAC annual, Grand Point, Tex.

Aug. 10-15-ARAC, western district meeting, Denver plant, Denver, Wash.

Aug. 15-16-American Institute of Electrical Engineers, Pacific general meeting, Fairmont Hotel, San Francisco

Aug. 15-18-Hyatt, Pomona national convention, Fort Collins, Colo.

Aug. 19-20, 1-Anniversary Air, annual meeting, Statler Hotel, N. Y.

Sept. 1-7-International conference of Federal Aviation Authorities International, Waco-Fab Motel, Cleveland, Ohio

Sept. 1-5-1949 National Air Race, Clear Lake, Calif.

Sept. 6-8-Annual spool plug and systems conference, sponsored by Clumpings, Spool Plug Co., Hazelton, Toledo, Ohio

Sept. 7-11-12th Society of British Aircraft Convention being dinner and its location, Fairmont Hotel, Minneapolis, Minn.

Sept. 9-12-Close on maintenance of industrial instruments, Instrument Society of America, Statler Hotel, St. Louis

Sept. 10-10th International Northwest Airline Council convention, Spokane, Wash.

Oct. 15-16-Tenets anniversary meeting, Ninety Nine, Wildcat Airport, New York

Oct. 18-22-ANAC national assembly meeting and aircraft engineering display, Billings Hotel, Los Angeles

Oct. 30-31-Third annual San Francisco Air Fair, sponsored by Ives Aircraft Co. of Connecticut, San Francisco, Calif.

Oct. 16-20, 2-annual convention, National Association of State Aviation Officials, New Orleans

Nov. 9-11-Seventh annual meeting, Airline Operators and Manufacturers Association, French Lick Springs Hotel, French Lick, Ind.

Jan. 1949, 1950-AN American Air Mail magazine, Milwaukee

PICTURE CREDITS

71-MATHE; 21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-123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For REEBO 14K2212-1 Switch
Switch Die cast aluminum. Heavy arm adjustable through 90° and reset 90° in either direction.

MICRO R2-R31 Basic Switch
AN 3210-1



Size of housing
1 1/2" x 1 1/2" x 1 1/2"

A single pole, double-throw basic switch design which meets Army-Navy environmental shock tests.

Lightweight but rugged housing with standard plug-in type switch enclosed within housing.

MICRO R2B-PN11
Die Cast Enclosed
Switch AN3217-1



Size of housing
1 1/2" x 1 1/2" x 1 1/2"

MICRO 2VR1
Pneumatic
Housing



For either use as a MICRO V-1 (AN3214-1) Switch or as a pneumatic actuator.

MICRO V3-1 Switch AN 3224-1

Size of housing
1 1/2" x 1 1/2" x 1 1/2"

Size of housing

R.C. Bellini, 2 exposures, 28.5 volts at 42,000 ft altitude, 10 exposures, 28.5 volts at 42,000 ft.

MICRO 1VA1 Rotary Actuator
Housing



Size of housing 1 1/2" x 1 1/2" x 1 1/2"

For actuating MICRO V3-1 Switch (AN3214-1) Adjustable through 360° and reset 90° in either direction.

WHO'S WHERE

► **President** McDonnell Aircraft Corp. moved Don R. Babin executive vice president. The firm took up its charge of engineering and contracts. C. Warren Davis steps up to vice president, then his old post of administrative vice president. Formerly Babin's assistant, moving up to manager of engineering.

► **Chief Engineer** Curtiss-Wright Corp.'s propeller division promoted Francis R. O'Leary to the post of general manager. George W. Brady becomes director of engineering of the division, but also improves engineering department of new product power plants. Jack & Benita Peterson (by divorce) since vice president Frank R. Kolbmann moves up to the president's seat, in former president Kenneth G. Donald becomes director of the board.

► **New York Aircraft Corp.**, Millville, N.J., appointed Norman K. Tange its regional sales manager, based in New York City. W. J. Schickel has come out of retirement to take over as secretary and treasurer of Consolidated Valve Aircraft Corp. to succeed the late W. M. Shulman. Schickelman retired a year ago as General's director of flight.

► **Chief Engineer** Curtiss-Wright Corp. promoted Alvin A. Feltre to acting sales manager at Amesbury, Mass. in place of R. S. Dwyer, Inc. advertising agency in New York City. Sydney H. Carter moves over from Lapeere to become advertising and sales promotion manager of Texas Engineering and Mfg. Co.

► **H.C. Feltre** is acting sales manager at Amesbury, Mass. in place of R. S. Dwyer, Inc. advertising agency in New York City. Sydney H. Carter moves over from Lapeere to become advertising and sales promotion manager of Texas Engineering and Mfg. Co.

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INDUSTRY OBSERVER

► **Aug. 4** has been set by Searns Corp., Lancaster, Pa., as deadline for orders for its new metal fuel-jet propellers designed for Goodyear engine test plans, at delivery it is to be made in time for the Cleveland National Air Races. Searns says the metal two-blade has shown a 10 mph increase in top speed, 16 percent improvement in acceleration, and better rpm. repeat characteristics than its best comparable wood propeller. Incidentally, Searns' wood propellers were on both the 1947 and 1948 winning Goodyear airplanes. Designed for 190-hp in displacement engines, the new racing prop is priced at \$250.

► **Airbus** operating Boeing Structures have been asked to join with the United Command in an engineering study of factors in the recent engine cooling problems experienced with the double-duct transport's Pratt & Whitney R-4100 engines.

► **Dresser Helicopters** at Dearborn, Conn., reports test pilot Al Bott has flown a flying test bed R-4 fuselage with a Dresser four-blade rotor system for as long as 45 minutes without touching the stick, pitch control or throttle. Fuel is attributed to the dynamic balance of the rotor system.

► **Texas Engineering & Manufacturing Co.**, Inc., Dallas, has been testing an experimental Swift two-place with 145-hp engine, and is studying the 1950 market for such a plane, expected to sell for around \$6000 and to cruise at around 150 mph. The new model TB-2A is not to be confused with the 145-hp TB-1A tandem airplane type trainer.

► **Piper Aircraft Corp.**, Lock Haven, Pa., has a contract to build 105 liaison planes designated L-180 for the Turkish Air Force. Plans will be used in light training. Plans is similar to PA-11 Trainer with 65-hp Continental engine.

► **Boeing Aircraft Co.**, Wichita division, is testing a design on a new 150-hp capacity Elliptical structure wing fuselage machine, costing approximately \$175,000, to be used to form skin sections for wing, fuselage and extruded structural parts. Machine will handle sheets up to 66 in. by 144 in. and extrusions within these limits.

► **Brook Aircraft Corp.** is equipping a four-place Bonanza for a trans-Atlantic trip proposed by J. M. Rosello, Italian pilot. Plane will be equipped essentially as was Bill Oden's Waldorf Birch plane which flew approximately 3000 miles nonstop, but Brook Aircraft will not sponsor the Italian's flight as it did Oden's. Rosello plans to take off from Portugal in August and fly to N. Y.

► **North American Aviation, Inc.**, has delivered the first of an order for 758 advanced trainer (T-38) for static test at Wright Field structures laboratory, a month ahead of schedule. Delivery was made in a C-52 transport. First flying T-38 is expected to get off the ground within next few weeks.

► **Beech Howard** gave his first public exhibition in his Warner-powered Beech-Hawarden recently at Houston. Beech took AVIATION WEEK that the Warner 185 hp engine in addition to offering increased power over the original Cessna engine has provided almost entirely the same balance, extremely important in the land of aerobics. Beech says

Coach Study

CAB survey reveals what low-fare service has meant to airlines.

Impact of an coach service on the operations of five certificated domestic airlines offering the service, all of which were disclosed in a comprehensive 50 page report made public by the Civil Aeronautics Board last week.

The study stemmed from detailed cost-accounting of questionnaires filed out during May by 7900 passengers on 251 coach flights and 30,000 passengers on 1120 non-coach flights. The data will be a major factor in CAB's forthcoming decision on how far domestic airlines should be permitted to expand (Aeronautics News, July 15).

Supplemental financial and traffic data was incorporated into the study of questionnaire returns from Capital Airlines, Mid-Continent Airlines, Continental Air Lines, TWA and Northwest Airlines.

► **Indications**—CAB announced no conclusions from its air coach study. But these facts stood out:

1. About two-thirds of the passengers going on coach would not have ridden the subject air if all air coach were not available.

2. Air coach as early as last spring accounted for almost one-quarter of Capital Airlines' total passenger miles and over one-fifth of Northwest's.

3. Passenger load factor on four-coach-mile coach flights operated by Capital, Northwest and TWA during April and May far exceeded load factors on their own regular scheduled airline schedules. Mid-Continent and Continental apparently were having trouble developing traffic for the new service.

4. About 28.9 percent of the air coach passengers survived some making their first air coach flight against 18.8 percent for flights on regular fare schedules.

5. Capital Airlines, which claims to have the most air coach passengers, then all other scheduled U.S. carriers combined reported that 24.4 percent of its total passenger miles and 17 percent of its passenger revenue during April and May, 1959, came from its brand new service. The company keeps operating its low fare DC-4 "Nighthawk" flights between New York and Chicago last May 4, started an air coach service between New York and New Orleans May 16, and between Washington and Chicago on Aug. 1.

► **Northwest** said 28.7 percent of its total passenger miles and 17 percent of its passenger revenue during April and May, 1959, came from its brand new service. The company keeps operating its low fare DC-4 "Nighthawk" flights between New York and Chicago last May 4, started an air coach service between New York and New Orleans May 16, and between Washington and Chicago on Aug. 1.

its passenger revenue were derived from air coach during the two-month survey period. NWA started its low fare DC-4 service between New York and Seattle on May 24.

► **Continental** disclosed that about 5 percent of its passenger miles and 3.6 percent of its overall revenue were from air coach services in April and May. CAB's DG-Is have been making four-coach-mile flights between Kansas City and Denver since Feb. 17.

► **TWA** reported 4.1 percent of its passenger miles and 2.8 percent of its passenger revenue came from air coach in the survey months. The company has been offering DC-1 coach flights between Kansas City and Los Angeles since Feb. 6. In New York-Chicago Shuttleline service at least one mile was not stated until May 31 and did not figure in the study.

► **Mid-Continent**, which operates coach flights between Kansas City to Minneapolis-St. Paul, and 4 percent of its passenger miles and 2.8 percent of its passenger revenue were from the low fare service during April and May. MCA's coach train started on May 1.

With the exception of Capital's New York-Chicago "Nighthawk", all of the coach services had operated less than two months prior to the CAB survey. Even so, combined passenger load factors for some of the five carriers' brand class services went substantially higher than load factors on regular flights.

► **Load Factor Comparison**—Northwest's April-May passenger load factor on air coach was 83.9 percent against 58.4 percent on regular service. Capital's coach load factors were 75.2 percent against 59.6 percent, TWA's 74.2 percent against 51.5 percent, Mid-Continent's 73.8 percent against 59.3 percent, and Continental's 59.8 percent against 46.3 percent.

The four-coach-mile coach flights operated by the certificated airlines generally have their terminals between 10 p.m. and 3 a.m. Usual convenience for travelers and results are discussed.

There are still reports on MATS where USAF and Navy policy clash. For example, USAF views its flight control system primarily as an advisory service, Navy regards it as a means of enforcing rigid air discipline and restrictions from the ground. USAF has been seen for specific functions: Navy pre-views its extension to be allowed to permit Navy when black box on days when USAF personnel are not on duty. MATS personnel are still disciplined under the separate legal codes of their respective services.

New Pitch Control

Shenley Aircraft has announced a hydraulic pitch rate control, which permits flapless control instead of the steady gap heavily required on the stick. The new device has already demonstrated its ability to reduce pilot fatigue in many hours of demonstration flying at both Naval and Air Force installations.

The device is operated by a 1/8000 psi hydraulic pump and can be easily installed on present Sikorsky helicopters. It will be made of a complete kit suitable for field installation. The new control is scheduled for installation on production aircraft in the near future.



ON TRANSLATLANTIC DUTY one Douglas C-74 does the job of three C-54s cargo-wise, while . . .

... PASSENGERWISE the Lockheed C-52IIA's speed and payload makes it worth two C-54s.

MATS Proves Unification Case

Although some traditions hold on, remarkable progress has been made in consolidation; air coach tried.

By Robert Hott

After a year's operation, Military Air Transport Service is the same outfit in the same clothes.

► **620** multi-engine transports assigned equipped with 797 4-year age.

► **46,100** personnel assigned compared to 54,995 a year ago. Latest breakdown shows 7,060 USAF and 50,030 Navy personnel on MATS plus 25,890 USAF personnel on MATS service commands (Air Reserve, Air Force, Air National Guard, Air Weather Service, Base Command, etc.).

► **177** million man miles flown during the first year of MATS operation.

Among the most accomplishments of MATS transport division are:

► **Consolidation** of major terminal facilities where USAF and Navy formerly maintained separate air terminal facilities.

► **Regiment** consolidations were at Washington National, Henson and San Francisco. MATS staff at Washington National is now slightly smaller than the total of AWC and NATS personnel formerly assigned there and handles a slightly larger volume of air traffic.

CAA's 1950 Airport Program

Civil Aeronautics Administration's Federal Aid Airport Program will authorize 114 projects involving \$25,540,767 in Federal funds during fiscal 1959. Local sponsors will provide matching funds totaling \$17,452,732.

The 114 projects include 172 Class I, II and III airports, 141 Class IV or larger airports, and one seaplane base. Eighteen airports throughout the country will receive over \$5 million in total funds, from both Federal and local or state sources. These include Phoenix (\$4,845,000), Los Angeles Municipal (\$3,745,000), San Francisco Municipal (\$3,665,000), Miami International (\$3,060,000), Atlanta (\$1,700,000), Chicago Orchard (\$4,771,600), Baltimore Friendship (\$1,000,000), Worcester Mass. Municipal (\$1,700,000).

Other \$3 million is for administrative purposes, \$500,000 for work on the Washington, D.C. Municipal Municipal (\$1,665,000), Atlanta (\$1,700,000), Chicago Orchard (\$4,771,600), Baltimore Friendship (\$1,000,000), Worcester Mass. Municipal (\$1,700,000).

- **Establishment of a single air bill and priority status for all three services.** In terms of end use, this replaced the 7 to 9 copies acquired of separate USAF, Army and Navy shipping bills to three copies of the new standardized air bill. In addition to streamlining and paper reduction, the new bill directs both units in inter-service cooperation.
- **Development of a single air traffic control for all three services.** Project a new, under way to develop a standard transport operations manual.
- **Use of coded, nonclassifying and nonsecretary by criteria** to replace the complex and cumbersome Air Materiel Command depot aviation (Aviation Week July 18), and get away from the old of the military.
- **Development of the first operational experience on long range post war strategic air transport types** (Deng Ju C-74, Boeing C-97, and Lockheed C-124).
- **Development of specialized ground handling equipment** for long transport planes. As a result of MATS studies, ground handling equipment is now scheduled in the equipment procurement package for new transports. Previously nobody worried about the ground equipment until the transports were delivered.

Airfield Infrastructure—MATS last year was dominated by the selection of the Berlin route which began just 26 days after MATS was officially activated on June 1, 1948. The great majority of MATS transport activity has been in support of the Berlin airlift and in the assigned C-54 transports are actually operating in Germany. Despite that, the command team MATS dropped only two of its previous transport routes—a run from Puerto Rico to San Diego and another from Germany to the Aleutians in Tokyo.

In addition to airlift support, MATS furnished special airlift for the Navy's requirements. That included the scheduled mail work of Arctic weather stations. An airport at occupation forces in Japan and the Navy's Pacific Fleet was maintained at 75 percent of the peak with three C-54s and two C-47s being built, Marine C-54s and Far Eastern Air Force transports all operating under MATS direction. Berlin Airlift C-54s in transit to reinforcement depots in the United States were used to keep up the military transport quota within the United States.

Big Transports—Perhaps MATS' most interesting experience of its first year was the introduction of three new types of long range strategic transport. MATS commander Maj. Gen. L. S. Kuter is particularly pleased with the coming out of these types. He believes that the trend toward larger military transports will continue in the post-war which ground handling becomes too

cumbersome to pay off in increased transport efficiency.

The Douglas C-74 fact has been the most interesting in handling equipment between Germany and U.S. reinforcement depots. On the spot, the C-74s have been doing the work of 21 C-54s. Gen. Kuter believes considerable work must be done in proving out the C-74 on general cargo but points to a level of 67 passengers and 12,000 lb. of cargo from Bremen to Manila, Ala., as an example of what can be done with a C-74.

Military Air Caches—The Lockheed C-124As are being used mainly for personnel transport across the Atlantic. Combination of greater speed and capacity have proved the C-124s to equal two C-54s on the trans-Atlantic run. MATS has put the first large air

couch air operation in the Pacific with a Boeing C-70B equipped to handle 35 passengers.

In its work with the large transports MATS has also worked out new tests for space parts procurement based on actual experience rather than theory. New transports are now packaged with a supplementary contract for keeping the plane in space for its anticipated life.

For the Lockheed C-124As MATS has worked out an experimental arrangement whereby anybody at MATS first needs C-124A space parts can order them directly from Lockheed, and MATS is billed. This eliminates a confusion of military and civil in regard to ordering, and speeds the parts to where they are most needed, instead of gathering dust in some military warehouse.

U.S. To Ask Airline for Japan

Intra-Island service likely to be owned and operated jointly by foreign carriers now serving Japan.

(McGraw Hill World News)

TOKYO—Soon the U.S. can be expected to ask the ICAO Eastern Commission (HEC) to approve the creation of an internal commercial airline for Japan.

Officials of CEK, Supreme Commander for the Allied Forces (SCAP), refuse to discuss the problem as it now exists without regarding internal aviation. They state that SCAP is involved in Far Eastern Commission discussions which have Japanese participation is considered objectionable to development. Until the HEC approves changes, they claim nothing can be done.

Newsday—But—However, there is considerable basis for assuming that SCAP has asked the U.S. to take up the subject in the HEC. SCAP will naturally consider any delay. But it states that an internal airline is a necessary part of the transition for peaceful post-war Japan and that it would contribute to the country's economic recovery. SCAP's official discussion was revised recently for the fourth or fifth time in six years prior to return to SCAP in Washington.

SCAP has also asked for military U.S. action, but this is doubtful. It would have to pass such a request on the absolute necessity of an internal airline in Japan's economic recovery. This could be difficult to prove.

Commerce Cases—SCAP's Economic and Scientific Commission (ESC) has been definite in stating that an internal airline is economically justifiable. ESC is concerned about sources of foreign currency revenue with which an airline could meet its necessary external payments for gasoline, pilots, crew, maintenance parts as well as original equipment.

One solution may be to allow purchase of tickets by foreigners only as acceptable foreign currency (dollars or yen). An international airline might be billed entirely in foreign currency. Only Japanese foreign and internal cargo traffic would be listed in yen.

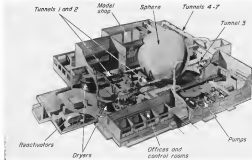
One shipping block has been discussed as to operations of an internal carrier. Even if the HEC approves an airline, it certainly will have Japanese participation.

Foreign Owned—Narrower in that sense to be a joint Japanese-owned and managed carrier. Both the Far Eastern Airway American and Northwest Airlines have applied for permission to conduct such routes. Conditions are being set. The British Overseas Airways Corp., Canadian Pacific and Trans Canada have voiced interest in internal operations.

Just Cooper—As outlined here, the Japanese development will be created with all airlines restricted to operate into Japan restricted to buy equal shares in the airline. Participants would provide necessary foreign capital to get the line going. It is anticipated that the company revenue earnings from foreign ticket purchases and international freight would keep the line operating.

Yet another ban domestic passengers and cargo would exist at first, especially for the Japanese government and construction. Participating companies could not expect an immediate financial output earnings but would be entitled to yen income which would be applied to their own costs of doing business in Japan.

AERONAUTICAL ENGINEERING



Widened test, 75,000-cu. ft. vacuum sphere, key component in modified Koehl tunnel, drove outside air through test section.

Captured Tunnel Advances U.S. Research

Famed Koehl installation put in operation at Navy's White Oak Lab. Feature is low power requirement.

By Robert McGarvey

After a turbulent start extending from the Baltic Sea to Bremen and across the Atlantic in Maryland, the famed Koehl experiment was moved to a new in-lab operation for the United States Navy.

The aerodynamic center in shell is a new tribute to the importance of the tunnel but valuable part of research equipment.

The outstanding attribute of the Koehl tunnel, due to its international operation, is its low power requirement about 1/10th that of an equivalent tunnel designed for continuous operation.

Power in Spain—the new science of aerodynamic wind tunnel design began to flourish in the late 'thirties, it became increasingly clear that the power required for operation is related to the test section Mach number. Among the same test section density, the power required varies directly with the Mach number.

The Mach number obtainable at

the test section is determined by the pressure ratio across the section. For example, a first section Mach number of 2.1 will require a pressure ratio of only 2, but a first section Mach number of 4.0 will require a pressure ratio of 10, or five times as much. For Mach numbers higher than 4.0 the deteriorating factor in the stability, rather than the efficiency of the required power.

Legendary—The power problem was solved in Nazi Germany, even before the design of the "Wunderkammer," a supersonic nozzle 25 ft. 6 in. long weighing 8400 lb. Constant development work on the wings and equipment of this machine finally produced a design with a constant point movement of less than 0.05 inch over the whole range of Mach numbers from zero to 2.5, an amazing example of empirical research.

German Tunnel—Mach's has been written in print and anyone concerning German wartime experience wind tunnels, but actually these were only two high Mach number wind tunnels

ing General on the Baltic Sea in a research had for work on model-ported models. This station was under the direction of the Army Weapons Office and the V-2 and other Nazi models were developed as ordnance equipment for the ground forces in combat from the Luftwaffe.

Work on the station at Potsdamde was begun in 1930 and the wind tunnel was one of the first items of equipment to be completed. Research work began with the A-1 nozzle and continued on through the A-10 nozzle, the A-10 nozzle eventually reaching production as the prototype V-2 weapon.

This tunnel was also used to develop the design of the "Wunderkammer," a supersonic nozzle 25 ft. 6 in. long weighing 8400 lb. Constant development work on the wings and equipment of this machine finally produced a design with a constant point movement of less than 0.05 inch over the whole range of Mach numbers from zero to 2.5, an amazing example of empirical research.

German Tunnel—Mach's has been written in print and anyone concerning German wartime experience wind tunnels, but actually these were only two high Mach number wind tunnels

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Left: 4-ton valve (left), opening in 97 sec., covers sphere with test section. Right: Motor and vacuum pump in operation.

which placed important roles in the supersonic research program of the Navy the previous 4 1/2 x 5 1/2 inch Mach 10 tunnel of the Aeroblastische Versuchsanstalt Gottingen, and the Koehl tunnel.

Both were of the atmospheric-open type with rectangular test sections and open pit design. There were two other supersonic tunnels placed in operation during 1945, for the late, no reference design, and the latest March 18-6 tunnel was still under construction at Koehl when the war ended.

►Ponders—The Koehl tunnel was in full operation through 1948 and 1949, the cost of the latter year saving the final aerodynamic development of the V-2 missile. The first missile was fired in July, 1942, and the first successful launching was made in October, 1942. When photo-atomic aircraft of the Royal Air Force delivered the station at Peenemunde in the summer of 1943 it was far too late for intercepting of the V-2 research program. The first RAF raid on the station was in August, 1943, but this caused an interruption of the research and development program.

The attack did not know the purpose of the station at the time and it was not until a year later that the importance of the site as a target was determined.

At this time three attacks by the 8th Air Force caused severe damage to the station and the device was (used) to transfer the work elsewhere. Production and development of the V-2 missile was transferred to Nordhausen and Blechstein, the theoretical section was moved to the vicinity of Garmisch-Partenkirchen and the wind tunnel and aerodynamics work transferred to Koehl, about 25 miles south of Munich. The station was the Western Aeroblastische Versuchsanstalt (WVA) and was in full operation at the time U. S. forces arrived about May 1, 1945.

►Second Move—The tunnel was in- signed to the U. S. Navy in June, 1945 by decision of the Joint Chiefs of Staff. The Navy Bureau of Ordnance decided to dismantle the tunnel and ship it to the United States and Canada. It was then decided that Koehl was assigned to supervise the job. The tunnel was shipped in October, 1945, and the job of reconstruction and re-creation was begun at the new Naval Ordnance Laboratory, White Oak, Md., in July, 1946, under the direction of Mr. L. C. Fisher.

The contracts for the primary build was made in July, 1946, but considerable delay due to administrative and steel strikes delayed the completion of the installation until July 1, 1948, when it was first blown through the tunnel.

On Nov. 24, 1948, it was blown through the tunnel at Mach 5.18, the actual speed in the tunnel was 1573 mph at a temperature of -177 F. This corresponds to a speed of 960 mph, under standard sea level conditions.

►Tunnel Open—The tunnel, originally operated at Koehl, was actually two identical tunnels 40 x 40 in. (16 x 16 in.), powered by a single system with a capacity of 750 miles water (25,500 cu ft). It had a maximum opening time of about 15 sec. and a maximum Mach number of 4.6.

Evacuation of the tunnel was accomplished by three 200-hp (150-hp) vacuum operating vacuum pumps (KOL) solutions indicate that maximum operation of the tunnel would require 60,000 hp, whereas intermediate operation only required 750 hp.

It was decided not to replicate the original sealed sphere and as such, new welded steel sphere 52 ft in diameter and with a capacity of 75,000 cu ft (more than twice that of the original sphere) was erected by the Chicago Bridge and Iron Works.

Other than this the remainder of

the equipment in the room in that used at Koehl, including the station, test sections, quick opening valves, and other parts.

►Operation—The tunnel was sealed off and the motor pump was out of the sphere until it is evacuated to a 99.5 percent vacuum. The three pumps take about 15 minutes to produce this near vacuum.

With a missile model installed in one of the tunnels, a quick-opening valve permits air at atmospheric pressure to move from air intake outside the building through the test section and into the vacuum in the sphere. The pressure in the sphere vacuums to atmospheric in 40-45 sec. and the flow stops.

During this brief time, spheres are prepared for another qualitative data in the flow and recording instrumentation measures quantitative data in 30, 40, and 50 sec. and gathering moment of the missile model.

Meanwhile, the model in the other tunnel is being prepared and when the sphere has been evacuated, it is admitted into the other tunnel, while changes in the first tunnel are being made.

►Equipment—Each of the three German Siemens electric motors is mounted between two vacuum pumps. Each motor is rated at 100 hp when operated at a 4800 volt, 60 cycle power supply.

As these motors were originally designed and operated by the Germans, they were powered by 6000 volts at 50 cycles. However, with five design and U. S. electrical control, they would have run 25 percent overrated. This was eliminated by installing speed dropping reactors. The motors are simple wound rotor type.

The six Direct Drive pumps are of the positive displacement type using sliding vanes. The pump impeller and the pump case are intricate and the blades slide in and out of slots in the impeller, centrifugal force causing them to rotate

along the surface of the casing during a portion of each revolution. During the remainder of the revolution, the air is forced back into the slots by the centrifugal force between the shaft and case. The motor and pump are operated continuously.

► **Valve Importance**—One of the critical items in the operation is the instant non-type tunnel is the quick-opening valve. Minimum pressure ratio is obtained across the test section of such a tunnel when the tangential laminar flow is vacuum of the sphere and atmospheric pressure is obtained instantaneously. If a slow-opening valve is used, much of this pressure ratio is lost in the passage.

One of the finest examples of GCA's data capability and skill are the large Polaris valves, which, although weighing 4 tons each, are lifted from their seats, raised 90 deg, and returned to their seats at the subsonic flow of just 0.7 sec.

► **Flow Transients**—The high pressure ratio across the test section that characterizes high Mach number tests results from slow opening and closing, tests, create extremely low transients.

As the air approaches the test section it is first accelerated to sonic speed by a convergent duct. Beyond this throat the duct is divergent to expand the air to supersonic Mach numbers. This expansion takes place at the expense of the best energy in the air, thereby producing extremely low temperatures. Naturally, the speed of sound is greatly reduced and the Mach number for a given flow velocity is increased.

For example, when the velocity of the air into the test section is 1150 mph, the temperature is only -171°F. Below the speed of sound at this temperature is only 560 mph, based on density as Mach 2.0. When the velocity is increased to 1760 mph (which, under standard sea level conditions, would be Mach 2.5), the temperature drops to -253°F, at which the speed of sound is only 517 mph. At this velocity, the test section is operating at Mach number 3.4.

► **Good Acoustic Characteristics**—Because of these extremely low temperatures, the air must be insulated from the pressure transducer and its extreme heat, frozen so that it can pass through the orifice. Characteristic release heat, which changes the temperature and makes the orifice the wrong shape to produce the desired Mach number.

The flow of air, therefore, is subsonic in the test section along the test section and shows at a Mach number lower than is desired. For this reason, the air which enters the bearing are recirculated in large slots and air flowing out.

► **Noise Block**—The original Kichel



Position of 520, sphere is seen in foreground. Welded plate is 3/4 in. thick.

noise block design are used in the NOL tunnels. These blocks are designed to produce Mach numbers of 1.2, 1.56, 1.86, 2.04, 2.02, 3.24 and 4.35 plus a 5 lb/sec of blocks designed but not used by the Germans. These blocks are carefully chosen to produce the selected Mach number.

Natural blocks may be any convenient length but the throat opening and the shape of the cavity must be a circle, conical form, which will produce a free spin and flow parallel to the flow at all points in the test section of the tunnel.

The original Kichel mount support and balance systems are used. This model is mounted on a "spring" support, which, in turn, is held to a circular support. The angle of attack of the model is changed by rotating the circular support. The strong support can be either a solid or split type depending upon the type of test being run.

► **Expansion Plans**—Naval Ordnance Laboratory has plans for a substantial expansion of the equipment operated from the sphere and associated ground air equipment over that used at Kichel.

The completed plan contemplates a total of seven tunnels including (1) 20 x 40 cm tunnel—now in operation, (2) an 18 x 18 cm tunnel, which will be operated continuously from the area opened by slots of the vacuum pump, which can produce enough suction through the sphere to operate the small tunnel, (3) a 12 x 12 cm hypersonic tunnel, (4) a 12 x 12 cm internal aerodynamic tunnel, (5) a 12 x 12 cm aerodynamic tunnel, and (6) a 12 x 12 cm ball transfer tunnel.

All of these will be fed from a common air duct, the air proceeding through the handle in the vacuum

pump. It is anticipated that the hypersonic tunnel will be able to achieve velocities greater than 5000 mph. Plans are also under way for eventual installation operation of the 60 x 40 cm tunnels through the use of special high capacity blowers. Even pumps, in order to operate, these tunnels will be located in a separate building and be driven by electric motors. NOL scientists are seeking a minimum Mach number of 7.0 with this new equipment, which will operate entirely separate from the vacuum sphere.

► **Limitations**—Although substantial important research and test work can be accomplished by the Kichel type tunnel at a comparatively low expense of power, the advantage is a patent, naturally, at the cost of something else. First disadvantage is the extremely short time available for actual test, plus the fact that the testing must be interrupted during the time the sphere is changed.

Compared to a continuously-operated tunnel, the ratio of useful data to losses expended is considerably lower in the intermittent type tunnel.

Another limitation is the fact that the highest pressure available at the exit to the tunnel is atmospheric pressure, about 15 lb per sq in. From the exit of the tunnel to a near-vacuum pressure, a pressure is created the test section of a maximum of about 14-in. Higher pressure ratio can only be obtained by pressure driven air as in the compressor-driven continuous type tunnel.

However, within these limitations, the new NOL experiment tunnel facility is a unique and important addition to the associated research equipment of the country.

New Antenna Scheme

One of the latest developments in the NOL at non-echo antenna (ANAS) was W-28, 1968) is the use of all or part of the plane itself as an antenna, according to the Air National Command and Control.

This technique has been recommended by the use of low static frequencies requiring antenna structures in large in the aircraft fly area.

It involves collecting a small part of the plane—wing tip, tail fin—plus leading wing section a plane covered leading section to create the entire wing.

Using the same principle is as required, but only the facility also can be designed to act as an antenna.

Another method for extending the wing is to install an antenna end flow to it in the fuselage and electrically in one meter over into the wing structure.

At airports around the world where weather is unpredictable and landing requires a skilled, precision instrument, airline pilots choose GCA as their primary landing aid.

At Gander, Newfoundland, GCA is operated and used regularly by 10 trans-Atlantic airlines: Air France, American Overseas, British Overseas, KLM, Pan American, Sabena, Swissair, Western, Scandinavian Airlines, Trans-Canada and Trans-World, at Edmonton and Ft. Nelson, by Canadian Pacific planes, Northwest Airlines and Pan American.

Airline pilots also make daily use of GCA at Keflavik, Iceland; Shannon, Ireland; Plymouth, Scotland; London, Paris, Berlin, Frankfurt and Anchorage, Alaska; Sapporo and Adak in the Aleutians; Tokyo, Chongqing, and Gómeira, Japan; Seoul, Korea; Manila, Philippines; New York, Washington and Chicago.

Pilots choose GCA for two reasons: GCA has a perfect technical record and precision reliability, GCA is an aerial instrument—the pilot gets landing data without further distraction of his visual instrument panel.

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Russian Planes Show Improvement

War-time fighters' performance stepped up while jet work continues. Transport program yields results.

Russia is pushing flight tests and development work on jet aircraft and transport concepts, but its main jet work continues to be postwarage jet jet.

Development and production of transport planes has shown progress in the past year that is reflective in a growing number of production models in service.

These are the latest conclusions of a survey of Russian aircraft tested in flight by Aviation Week from reports coming from the country.

The information indicates:

► **Yak Improved**—The war-time Yak 9 fighter has been continually improved since the latest version, the model 91L, has a top speed of 490 mph, considerably better than the Republic P-47 Thunderbolt now on duty in Germany.

This speed gain is available only in one altitude, however, and the Yak 9L performance falls well below that of the Thunderbolt above 20,000 ft. The war-time Yak 9 fighter had a top speed of only 355 mph and the improved performance of the new model is due to the new Klimov VK-107 engine.

This engine develops 1900 hp for takeoff, compared to only 1200 hp in the earlier Yak 9 fighter. The new en-

gine is designed to assist a 75-mm cannon firing through the propeller hub. In addition, the weight of the new fighter has been reduced from the 7000 lb of the war-time version, providing increased maneuverability and higher climb rate.

► **La Series**—The Lavochkin fighter series has also been continued, with the La 9 the postwar version now in service.

This is basically the war-time La 7 but with the new ASH-60 engine. This engine is a "Chinese copy" of the latest Wright R-3350 Duplex Cyclone and provides 2000 hp for takeoff and over 1600 hp at cruise.

The La 9 is also in the 450 mph class due to this additional increase in power over the 1600 hp of the ASH-62 engine used in the La 7. The La 9 uses all-metal construction, in contrast to the war-time plywood-skinned construction of the war-time La 7 fighters, from which it is descended.

Maneuver includes two 20-mm cannons in the wings and two 50-cal (12.7-cal) machine guns in the nose. The new fighter carries two ordinary rocket motors under the wings for short bursts of speed in the 500 mph region.

Two rocket engines have also been installed experimentally under the wing

and may be used operationally whenever required.

► **Transport**—The well-known Ilyushin IL-12 continues to full production for Aeroflot with deliveries also scheduled for Caspian Airlines. Four different versions are available.

► **12-passenger** transport with a range of 1650 miles.

► **27-passenger** transport with a range of 1270 miles.

► **16-passenger** sleeper plane with a range of 1816 miles.

► **Cargo version** with a capacity of about 1000 lb, range a very short range.

The IL-12, which closely resembles the C-47A Dumbo, is now in use on the Siberian routes and makes the Moscow-Khabarovsk run of more than 4000 miles in 25 hours.

► **IL-29 Transport**—The large IL-29 is now undergoing service test preparation to assignment as a four-engine transport. It carries 66 passengers and a crew of five. It has a span of 131 ft, is 70 ft long and is, generally, a replica of the IL-70, passenger version of the capital flying IL-29 bomber.

The IL-29 is powered by four ASH-60 engines of 1700 hp at 2400 rpm for takeoff. It has a top speed of 510 mph and a range of about 3500 miles.

A newer Russian transport, not yet in wide service, is the Yak 16, a small but modern-looking fuseliner type with accommodations for 18 passengers and a crew of 5, a designation by U. S. standards. However, the third crew member is a navigator, which is required on even short range Russian aircraft due to the lack of a ground link and the barren nature of the country.

The Yak 16 is powered by two seven-cylinder SIB-23 engines, which are actually a single bank from the double-banked SIB-25 engine. For this reason, about 75 percent of the weight of the two engines are interchangeable (indicating no marked Russian attitude towards the problems of maintenance and repair).

The SIB-23 produces 700 hp and drives a two-blade propeller.

The Yak 16 has a top speed of 318 mph, cruises at 185 mph and lands at 50 mph. It has a range of 625 miles and a 16,300 lb. payload. It is designed for short range military routes of Aeroflot and is being offered for "export" to Communist-controlled nations, behind the Iron Curtain.

► **Research**—The design team of Mikoyan and Gurevich has continued its wartime series of single seat fighters with a new prototype design, which is believed to be a single type only. It is basically a war-time MiG-5 with an invisible rocket engine mounted in the tail.

It is powered by an ASH-62 piston engine developing 1825 hp at 2300 rpm for takeoff. The rocket engine uses

liquid fuel and is believed to be similar to wartime German Walter units adapted for the purpose.

In order to provide space and balance for the rocket fuel, the cockpit has been moved forward. The plane was flown in the 1946 aviation day display in Moscow but has not been reported since.

International Group Formulates Air Data

A step toward international agreement on standard thermodynamic properties of moist air in the range of pressure and temperature of interest to aerodynamic, air conditioning and chemical engineers, and to meteorologists, was taken recently by members of the International Joint Committee on Thermodynamic Data.

The committee, an international group started in 1945 by the American Society of Heating and Ventilating Engineers.

The group voted unanimously to accept final report of its working subcommittee, which recommended a formulation of the thermodynamic properties of moist air, which is claimed to be valid over a considerable range of pressure and temperature, and thermodynamically consistent within the accuracy of existing data.

Present experiments of formulation are given in tables with some needed information. Recommendations regarding best values of relevant physical constants and necessary factors are included.

On question of terminology, the committee voted to define dry air as a fixed, not variable, composition. It agreed that the term "specific humidity" be discarded in favor of "humidity ratio" to designate weight of water vapor per unit weight of dry air.

Active humidity was defined as "that of the given humidity ratio, rise to the humidity ratio state at saturation with respect to liquid at the given temperature and pressure." This definition was adopted previously by the International Meteorological Organization.

Objectives of the group are to:

- Obtain information regarding thermodynamic properties of moist air, which can obtain general compliance in standard use in the present that it is thermodynamically consistent within the accuracy of existing knowledge.
- Develop specifications of standard elements for the practical realization of these properties in the field.
- Recommend standard symbols, terminology, and charts calculated in accordance with understanding of underlying theory as to application in practical problems involving moist air.

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TEST BED ON A TEST BED

Bukhar's Phoenix transport engine, shown here mounted in back by a Lancia truck, was partly a "clash" in the development of the Phoenix engine, which is designed to power the Breda-Bonanza II and Standard-Rose 3000 flying boat.

revelations, straight jet with 2500 B. H. P., Phoenix is a testing platform for turbine and compressor units eventually to be adapted to the Phoenix. Although these or other have been the Phoenix engine will not go into general production

Lockheed Penetration Fighter...



range, speed and durability

This is the F-40, a Jet Penetration Fighter, built for the U.S. Air Force by the Lockheed Aircraft Corp. It is designed to fly long ranges at high speeds, to penetrate deep behind enemy lines to win and maintain air superiority and to destroy ground installations.

The F-40 is a big airplane for a big job. It is a rugged fighter, capable of withstanding heavy damage and taking a lot of punishment. And it is a two-fisted fighter—two jet engines, duplicate controls and two sets of controls. The vital in an airplane operation. It could suffer damage but keep on flying and still return to its base.

The F-40 is a versatile airplane, able to perform maneuvers besides penetration fighting. It can be adapted to other phases of modern warfare. Ground equipment can be serviced or repaired in a matter of minutes. Another simple modification and the F-40 is an excellent interceptor with outstanding climb, maneuverability and fire power. This quality of being easy to modify is one quality additional Air Force engineers will appreciate.

Lockheed

LOOK TO LOCKHEED FOR LEADERSHIP

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More Mathematics For Delta Wing

I am sure all equations approximating your errors of combined induced, axial, and the one on delta wings in your issue of July 4 should be no exception. In that paragraph which, however, I have also stated your assumption with the author that that seem to need further clarification.

Referring to para 22, induced paragraph, under Lift and Drag, the data on the air compressor wing is given. However, for a wing of thickness zero and aspect ratio 2. A perfect wing of finite thickness is necessary to compute the compressibility, but which greatly reduces the lift as the thickness ratio.

• **No Direct Compression**—In the second paragraph under Lift Compression, the lift coefficients and their angles of attack are not given under parallel conditions that parallel direct compression. If the angle of attack is to be taken as that of a complete wing of symmetrical section, the lift expression is good only for infinite aspect ratio, zero Mach number, and zero viscosity, and hence is obviously not valid for aspect ratio 2. The overall lift coefficient for a complete wing of aspect ratio 2 is considerably less than given by the second equation in the same paragraph at zero Mach number, but tends to approach the given value as the Mach number approaches unity.

In the last paragraph of the lift coefficient in the 4th paragraph the angle of attack is the same for the section as for the complete wing, but only for a two-dimensional section. For why, in effect, apply when the leading edge lies outside the Mach cone. The same condition applies to the lift equation given in the third paragraph under lift equation.

• **Non-Symmetrical**—In the second paragraph under Separation condition, at the risk of coming to light later, I would note for

algebra that drag due to lift is negative; thus not only can be called induced drag, but a quite correctly so called (K. G. p. 1, Ref. 1). However, I thoroughly agree with your implication that "induced" is not a good term for this type of drag.

The two-dimensional drag due to lift, in horizontal flow, is a single concept is already stated. The approximate expression for zero Mach number and properties of a delta wing is not particularly complicated, but is an exact, elegant, form, depending on whether the flow is subsonic or super sonic, and on the latter case on whether the leading edge is within or outside the Mach cone. For a rounded "delta wing" leading edge (within the Mach cone), it is a common practice to assume the theoretical leading edge position, but is brought out by W. G. Vassallo in the recent international conference, the full value is not then obtainable.

Robert H. Union
Professor of Aeronautical Engineering
University of Minnesota

• **Survey**—Glen E. Thompson, Lift and Drag of Thin Triangular Wings at Supersonic Speeds. NACA, T.R. No. 579, 1946.

(Thanks to the *Post* Editor for helpfully pointing out the omission of useful qualifications in summary in highly complex induced material.) It was felt this reference to "two-dimensional flow" implied the two-dimensional case. However, my sketch was given in one corner of the one of "a closed case," in the opposite case. This implies an induced angle of attack created by proportion forced of pressure changes in the downstream field behind the leading edge a shock, of course, is impossible to represent free by definition. As contained in the 3rd, Para 2, it says, with a rounded leading edge the lift section edge would be inclined forward, which not only produces the existence of an induced drag but also with center on "induced thrust" ("—L, M, L).

What Do You Say?

As a service to its readers, Aviation Week has summarized the Engineering Forum as a place where they can air their views—on technical, administrative, or supply matters—an engineering subject reported in Aviation Week or such engineering topics as they may choose.

The Editor hopes this space can be an engineering tool of value to all aeronautical engineers. Like any other tool, its value will depend on how well and often it is used. Address your letters to:

Engineering Forum
Aviation Week
310 West 42nd Street
New York 36, N. Y.

What Good Is It?

I signed Robert McInerney's article in the *Post* afterword in the May 2 issue of Aviation Week, but this is just another example of the industry, as engineers to get as mixed up in the low points of technology that they completely lose sight of the possibility of new methods.

For example, when the figure in the charts, I estimate a weight of 1600 gill of fuel for a light plane to climb to 4000 ft, with afterburner operating all the way. So far as I know this is there at least twice as much fuel as any of the present jet lighters can carry.

Therefore, even though this afterburner might double the rate-of-climb and the thrust available, what good is it if it is used but to imply that the lighters can set of gas about one-third the way up?

H. C. M.
SACRAMENTO, CALIF.



Ideal Fighter Cockpit: British Style

(McGraw-Hill World News)
London—British version of an "ideal" cockpit layout for a fighter plane, developed by the Ministry of Supply, was exhibited here recently.

A model of the installation was fitted into a dummy fuselage about the size of the new Hawker jet-powered fighter, the P.1040, to provide a layout suitable for RAF and Navy operators.

Whereas controls are fitted for two piston engines, only very minor changes would be required to adapt them for other present and future fighters.

• **Control Grouping**—The arrangement shows what can be done by careful planning to reduce air movements to a minimum. Controls are grouped in a natural pattern, leading to greater efficiency by using deliberate steps, identification by touch has been considered almost foolproof—essential for night flying.

In the flying and landing group, the undercarriage buttons, flap lever, fuel cocks, trimming wheels and a slotted aileron hand, control have been placed on or near the throttle and propeller controls.

• **Throttle Details**—After opening the throttle for takeoff, the thrust axis naturally against the landing gear button, which have warning lights along side.

A spring-loaded arm fits over the throttle and prevents there from being pulled back during a rocket-assisted or catapulted takeoff. Throttle is then kept open for maximum power.

An air-brake control switch mounted

directly below the throttle lever affords finger tip manipulation.

• **Instrumentation**—For blind flying instruments are set in a conventional pattern on the panel. Engine instruments on the instrument panel have been simplified by omitting oil pressure and temperature gauges and substituting warning lights. (This is in line with philosophy advanced by Lt. Cmdr G. H. Brown, USN, in his discussion of instrumentation for high-speed fighters, appearing in *Aeronautics News*, May 15, 1949.)

The pre-flight checklist is fitted into the center, leaving an unobstructed view when not in use. Checklist is so positioned that, even when extended, clearance is adequate for operation of the oxygen seat.

• **Electrical Controls**—These are grouped in a panel to the right of the cockpit and include instrument switches, radio set controls for cockpit lights, and main battery cut-out switch.

Firing switches are lined up under the throttle rubber covering, where they can be seen by day with maximum eye movement.

• **Stick, Seat—On the "push-pull" horizontal stick are a lever type brake control and gun firing and rocket launchers, all easily accessible to the finger tips, without confusion.**

Also included is a new type of ejection seat which carries a built-in oxygen source.

If fired in clear air and not grounded automatically before the cartridges due to being about ejection of the seat.

New Viewfinder Offers Many Uses

A new type viewfinder having possible applications for photo-navigation, aerial photography and pilot, has been developed under the direction of the Photographic Laboratory at Air Materiel Command Headquarters, Wright Field.

Designated Type D2, the device presents in erect, unreversed, clear image of the terrain directly below, or below and ahead, of the aircraft in which it is installed.

The image appears on an 8-in. diameter lens which can be placed on pilot's instrument panel if this location is desired.

The viewfinder consists primarily of two integrated optical systems. One gives a wide-angle image below and ahead of the plane, and is used for flight-line navigation and landing targets.

The second covers a narrower field, but in larger scale, directly below the craft. It is used to determine and correct drift and to act as a photographic viewfinder for cameras having small angles of field.

Both systems use the same diverging lens. Controls are provided for each type of usage to aid in solving problems of drift, direction of track line, correct exposure interval, and in determining the field of vision currents. Quick and easy changing from one optical system to the other is afforded.

The viewfinder is stated to have several advantages over those now in use. For one thing, AMGC pilots who require point out, installation of unit does not require extensive structural changes in aircraft. In the Rock RC 45, for example, all that is needed for satisfactory performance are two 2-in. holes. For jet aircraft, the optical path of the viewed image may be shifted and reversed so that it can pass through a jet nozzle.

AMGC reports that the Air Force is planning to try the device on a reconnaissance version of B-45 jet bomber.

If war power feasible for Navy, it may solve three of its operational problems.

• Difficulty in accurately controlling aircraft when flying a photographic flight path.

• Poor visual observation in recent helicopters when the objective is directly below the craft.

• Need for a method of more accurately dipping planes for landing on aircraft carriers.

While the new unit exhibits many potential uses, both Navy and Air Force technicians agree that the unit made more compact before it can be adapted for either service.

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NEW AVIATION PRODUCTS



Maintenance Aid

For fast maintenance on aircraft or at battery, "Safety Hydro-Lok" by drastically sized, manually operated, rolling tower, offered by Safety Mfg. Products, Inc., 6725 W. State St., Milwaukee 18, Wis., provides uniform platform at any level from 7-17 ft above floor.

Integral hydraulic steel body with hand winch gives access to platform when it is retracted position.

Platform is raised on hydraulic rams through operation of pump handle in critical or stand. It is lowered when hydraulic pressure is released by toggle air pump.

Control may be lowered by pulling pins attached to chains at floor corner. After rail is collapsed and platform lowered, tower can be moved through 7 ft door.

Device rolls on four rubber-tired wheel units. Safety brake on each corner locks both wheel and axle.

Control Amplifier

To meet stringent aircraft ambient conditions, "Master" control amplifier, Type 141, is offered by Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

Instrument incorporates highly accurate, electro-mechanical d.c. amplifier in input circuit and power output stage to drive through 490 ohm, 500 watt resistor. Depending on requirements of particular control circuit, either d.c. or integral chattering signal can be reproduced. Shock resistant unit is entirely hermetically sealed and guaranteed to maintain dependability in extreme of aircraft ambient conditions encountered.



Speeds Circuit Test

To permit use with quickly and accurately check, calibrate and pre-test electronic electrical circuits, speed testing device has been developed by Coer Electronics, Inc., 434 18th St., Brooklyn, N.Y.

Analyzer is incorporated to eliminate need for crawling into difficult places on aircraft and gives instant and specific check of control system that can be obtained through use of ring-out method.

Test units are made in order to fit the needs of other test and pre-test control circuit in a particular phase. Unit shown is for testing system in Control 240.

Fast-Acting Clamps

"Tig" line clamp, offered by Acton Corp., Mt. Vernon, N.Y., incorporates heavy action for quick installation and gyration screw for fast lockup. Its lighter, screw is fast rotated to engage threads with clamp slots, and then turned with screwdriver. Clamp moves in five inch for bore diameter of 1-1/2 in.

Tells Screw Sizes

Screw and wire gage, offered by Dayton Rogers Mfg. Co., Mansfield, Mass., quickly tells wood or machine screw sizes from No. 0 to 24. Left hand side of V-dot will measure diameter

from 1/16 to 1/2 in. Right-hand gage is about 1 1/2 in. long, 1 1/2 in. wide and 1/2 in. thick. Device is offered free upon request made on company letterhead.



High Altitude Ignition

Electrically sealed ignition units for small turbine, rocket and engine engines, developed by General Laboratories Associates, Inc., Norwalk, N.Y., are designed for altitudes exceeding 10,000 ft. Smaller unit operates from 24 d.c. input, max. 100 v. a.c. 400c.

Devices weigh 9-11 oz., are easy to mount and able to withstand 800 vibrations. Designed to handle from 2000 to 3000 V., they are shielded to meet military require ments and are available with or without auto flash. High tension output can be supplied for 7 mm. plug connector or low high-voltage, spring-loaded terminal for 5 mm. or 7 mm. sizes.



Drill Press Vise

In addition to speeding drill press operations, new accessory "Col-Vise," accurately dimensioned and featuring simple pins and buttons. Designed by Universal Vise & Tool Co., Fresno, Mich., unit clamps in column of single or multiple spindle drill presses. Features of use adjustable both angularly and radially, and center unit can be swung clear. Device has 15 x 4 in. jaw with a maximum opening of 6 in.

Models to fit drill press having stationary or movable table are available and 1/2, 3/4, 1 in. diameters of jaws can be accommodated. Accessory can be used as quick-acting machine vice by removing centers and rotation and holding pins is table.

PRODUCTION



Cocooning Avoids Line Shutdown

When F-86A landing gear supply was cut off, NAA kept production up by preserving incomplete planes.

North American Aviation, Inc. has developed a cocooning process for aircraft components to avoid costly production line shut-downs threatened because of delay in delivery of government furnished equipment.

First use of the cocoon process came when the strike at Rockwell Aviation Corp. caused a shortage of landing gear for the North American Sabre (F-86A) jet fighter being built for the U. S. Air Force.

Cost \$500—North American used 15 sets of landing gear to put Sabres rolling off the production line through emergency flight tests. On completion of flight tests gear was removed. Sabres were sprayed with a plastic solution that dried into an airtight cocoon that would preserve the planes indefinitely. About 100 sets of gear were used per plane at a cost of about \$100. When the landing gear was again available North American was concerned that Sabres a day.

By cocooning the incomplete Sabres North American was able to avoid a major production line shut-down and was able to catch up on its USAF delivery schedule much faster than if the cocoon assembly line had been stopped by the strike and wheel shortages which are from the Rockwell strike.

Equipment Down—The brief production delay resulting from substitution of a new type turbine bucket blade on the General Electric 1-17 turboprop (Aircraft Works, July 10) did not seem to affect the production process to keep production going.

North American told suppliers that at its three plants has dropped from a January high of 21,210 to 17,800 with only the Downey plant where the A-1 production line for the Navy is well under way, showing an increase 1046 to 5120 during that period. Sabres now are being delivered to the USAF Fourth Fighter Group stationed at Langley TAFB, Va.

Production Briefing

PAC Business Up On Both Coasts

Pacific Aerospace has awarded a new batch of engine overhaul and aircraft overhaul contracts that will send components to its backlog of business at both Burbank, Calif., and London, N. J., facilities.

The new deals are:

- Overhaul for Pratt & Whitney R-4100 Wasp Major engines for Boeing Stearman trainers to be operated by Pan American Airways and American Overseas Airlines. PAA job for Pacific-Martin division will be done at Burbank and AOA handled at London.
- U. S. Air Force contract for reconstruction of T-28 trainers being released from storage depots. That contract will run through January, 1970 and totals about \$750,000.
- Equipment Down—The brief production delay resulting from substitution of a new type turbine bucket blade on the General Electric 1-17 turboprop (Aircraft Works, July 10) did not seem to affect the production process to keep production going.
- North American told suppliers that at its three plants has dropped from a January high of 21,210 to 17,800 with only the Downey plant where the A-1 production line for the Navy is well under way, showing an increase 1046 to 5120 during that period. Sabres now are being delivered to the USAF Fourth Fighter Group stationed at Langley TAFB, Va.

Supreme Court Upholds Lockheed

Lockheed's contract with the International Association of Machinists, American Lodge 725, giving union shop steward top priority as layoff, has been upheld by a unanimous decision of the U. S. Supreme Court. It reversed the lower courts.

The agreement was attacked by three veterans who were in the service in 1945 when a provision was added providing that union stewards were to be laid off last. In 1946, the veterans were laid off while a union steward with less seniority was kept on the job as provided by the contract. Although they were later rehired within a few weeks, the veterans sued for lost wages.

After the lower courts ruled in favor of the veterans, the union took the case to the Supreme Court as a test to protect its contract.

The Supreme court upheld its original opinion, replacement rights doctrine in the *Palmdale* case as assuming that veterans are rehired only in the ratios they would have held if they had not gone into war service.

PRODUCTION BRIEFING

• Aero Mfg. Corp.'s Nashville division has a subcontract from Consolidated Vultee Aircraft Corp. to make tips for the B-45 bomber being produced at Cassville, Mo. Work pending.

• General Electric Corp., Engine Air Service, Inc., Montreal, N. Y., have received under five new management of Kinross and Franklin Garment. New firm will return the recent General Electric Corp. and is building 28,000 jet engine to plant.

• Canadian Wooden Aircraft, Ltd. stopped operations in its Stratford, Ont., plant. Facilities have been sold to a Canadian corporation.

• Faced Aircraft Specialties, Escondido, Calif., is modernizing plant facilities and doing research on new processes in fabricating aircraft.

• Jack & Helene Precision Industries, Cleveland, now has 50 salaried in active employment, with a reported addition of 51.5 salaried in contracts during June.

• Pratt & Whitney division of United Aircraft Corp. will be closed for two weeks (July 29-Aug. 1) for inventory.

• Steadman Aviation Corp., Buffalo, was awarded \$152,000 in USAF and Navy contracts to bring the fleet's backlog to 115,562. They include development of three new production engine components, new electronic dual antenna, instru-

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Big Field for Copter Spray

Helicopter Services of California handles record business by exploiting numerous opportunities.

Added by specially devised agricultural attachments, Helicopter Services of California has completed disposal of one million pounds of liquid chemicals to kill weeds in grain fields.

Record was compiled during the spring of 1945 and first five months of 1946, but does not include drilling, logging, torching and sawing jobs performed by HRC.

• **Special Attachments**—Custom built 100 gal. capacity tank, trailers, draw bars, etc. solve the problem of transporting water for spraying operations. The California concern has also devised a complete spraying accessory system and specialized nozzles for seeding and dusting.

THC has made great strides in customer education. By being and looking the copier on the player's premises, he can observe and direct all phases of the opening operation. Customer's confidence is also assured, by being in close contact with the plant, since he can make work of alterations and give instructions as to special treatment for certain field areas.

► **Find Other Ticks**—In addition, the two-year-old camera snuck across thousands of miles of line patrol for the Pacific Gas and Electric Co. and the Pacific Telephone and Telegraph Co. HSC plots are able to penetrate areas marked as "be thorns to find and remove."

hacks and trouble spots dies ahead of
constant round cuts.

Though the U.S. and State Forest Services the aircraft has multifunctional use: surveillance and transport flights during forest fires. HBC successfully completed the first aerial scolding by helicopter when 1000 acres of burns in the Angeles National Forest was scolded to prevent soil erosion and landslides from occurring nearby towns.

► **Service Booklet**—Cessna's service is outlined in a 12-page booklet distributed to owners throughout the Cak forum area. The booklet gives a point-by-point description of why the helicopter is best suited to spend 2-4 D best proven, herbicide for broadleaf weed eradication. Also described are other helicopter features, including snow strip clearing, sprayer and drums, rock and gravel.

Two pages of testimonials from California users of agricultural herbicides are also included in the booklet. It is titled "Weed Control by Herbicides for the Smaller Grower—Herbicide Facts."

Helicopter Services of California has executive offices in San Francisco and operates from Oakland Municipal Airport. The company maintains an advisory service which is available for consultation without charge to contractors.

Water Tank Perils Roosevelt Field

Removet's Field, Manila, L. 1, has filed out to prevent local fishermen from creating a 152 ft. water tower 1000 ft. from the northern boundary of the field, in the turning and gliding zone of two runways.

Rosenfeld told claims the task committee is a nonpartisan body and violates regulations for the protection of air navigation established by CAA.

Currently, Rosecrans Field holds a Class 2 airport rating. If construction of the tank is rededged legal, the field will lose its rating since it would not qualify under a CAA regulation requiring an obstruction within a glide path of 10 ft horizontally to every foot vertically, from the end of the usable area of the field's landing area.

The case is scheduled for Dec. 5 in U. S. District Court, eastern district.

Calif. Private Plane Legislative Moves

California lawmakers successfully beat down attempts at the 1949 legislative session to slash the state's water conservation by cutting it off at the neck.

► **Budget Cut:** Votes were made in the state assembly to eliminate the non-renewable budget request for the 1999-00 fiscal year, but lawmakers were able to keep a \$100,000 appropriation for it in the state budget. The figure represented about two-thirds the amount which was originally requested by the contractor.

Commensurate splintering and the net will hamper its activities to a "considerable extent" but it still will be able to carry out its principal function of furthering the development of aspects and nations generally in the state.

- One of the bills, four of which were sent through the legislature, is assembly race Ralph Brown, D. Modesto, would relieve tenant owners and plots from liability for injuries or deaths suffered by non-paying guests unless "intentional or willful misconduct" can be proved.

- A feather of the seven rails is a fellow to tinker with aircraft
- A third rail is a person, often a politician, who is not allowed to speak

• The fourth in the Brown series limits midstream fees on oilfield to a total of \$250.

• Governor Warren also signed a bill by Sen. Arthur Lund, R., Colorado, to dissolve the State Narcotics Commission to streamline operation and handling of helicopters and similar aircraft in controlled areas.



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BRIEFING FOR DEALERS & DISTRIBUTORS

HELICOPTANE STATUS—Manufacturing rights to the disc-flying Helicoptane are expected to be made available to other manufacturers in addition to Fanchell Engine & Airplane Corp. The company which developed the plane, Helo Corp. of Boston, wants to make its present two-place prototype available for production to an established light-plane manufacturer in use as it fabricates with current tools. The license to Fanchell was non-exclusive in application to patent matters. Design features incorporated in the Helicoptane by its developer Prof. Otto Koppert would be adaptable to most of the current light-wing planes of its size with more or less modification, although indications point toward the Piper Vagabond as a likely first candidate for applying the Helicoptane technology. (The prototype Helicoptane was designed around a Vagabond fuselage.)

STANDARD PRODUCTS INC.—The new line of Standard Products, Inc., at 618 East Colburn, Wichita, has taken over their assets, shop equipment and inventory of the former aviation division of S. A. Long, Inc., at the same address. E. L. Cramb, president of the new organization, formerly was vice president in charge of the aviation division. Other principal officers of Standard Products are J. P. Gandy, vice president, and G. G. Wilson, office manager and assistant treasurer. The new organization will continue distribution of AN hardware, tools, supplies, instruments, accessories, test equipment, Helicoptane elements, Helicon drives, timing devices, timing batteries, and the operation of a CAA-approved laboratory for instrument and accuracy service.

CROSSWIND GEAR SAFETY—John Giese, CAA consultant on the outstanding cleared landing gear pilots out that 5.5 percent of 1964's major aircraft accidents were due to ground loops. 11.5 percent due to undershooting or over-shooting the runway, and 12.5 percent were due to coming up or over. Use of the cross wind gear eliminates ground loops completely, and because of this effect, the main wheels can be placed farther forward, as a preventive for noseovers, Giese states. And if single runway airports, made possible by crosswind gear usage, become more prevalent, these airports could be extended to minimize the undershooting and overshooting hazard. He recommends flying two runways end to end, as the best method of airport design for safety, and points out eligibility for heavy transport and military use as an emergency.

ATLAS DEMONSTRATORS—Production of 30 demonstrator models of the Atlas 14-10 all-metal four-place plane are scheduled to start soon at Hensel Corp., according to announcement from H. Ross Peacock, Atlas Aircraft Corp. president. The 218 hp. plane was first announced a year ago (Aviation Week, Aug. 23, 1968) by Max B. Joriles, then Atlas president, and designer of the 14-10. Peacock and the corporation had received approval by the California department of transportation as application to state and sell 250,000 shares at 35 per share. Public offering will be \$8,650,000, the remainder being advanced or guaranteed for dealers and company personnel, he said. Price is expected to sell at "around" \$10,000. "The 14-10's original target price of \$2995 met with considerable industry skepticism last year."

CLIPPER ON FLOATS—Pushing its best sell, the four-place Piper Clipper, into new fields of competition, Piper Aircraft has obtained CAA approval on a float-type version of the Clipper which will sell at \$14,975.16. A float-equipped Clipper is now leaving New England and Middle Western lake areas. The model 1455 "Ede Skutts" cut into the Clipper's profile, and show its cruising speed, as floats shows do, but they are positive the airplane owner is willing to pay what he is flying in this country. With floats the Clipper payload shows up at 688 lb. cruising speed at 97 mph, and landing speed at 52 mph. It has a 400-mph. range with full 16 gal. fuel load. As a carrier of four people, there isn't much room for luggage or fuel in the airplane, but for a model case or a vacation trip, there is plenty of room left for gear and fuel, and that obviously is what Bill Piper Sr. was talking about.

—ALEXANDER MEISURLEY

AIR TRANSPORT Airlines Study Fuller Use of GCA

Near accidents during ILS approaches point up value of monitoring function of radar system.

The domestic airlines are redoubting their efforts to have pilots take full advantage of the advanced radar system of safety that GCA (ground controlled approach) monitoring can provide as ILS findings.

Most airports of domestic airline pilots are not familiar with GCA facilities, according to one top Civil Aeronautics Administration official who had many discussions with flight crew members during an extensive tour of scheduled ILS routes.

He said it appeared that most pilots do not even appreciate that GCA now is available at Chicago, New York and Washington (and should soon be ready at other ports).

Midwest Ground-Two aeronautical club pilots emphasized the value of radar-monitored ILS approaches. It was felt that one of the incidents might have been avoided had the pilot making the approach received both advisory and emergency information issued by the CCA controllers.

On Mar. 26, an American Airlines DC-65 took a power loss during its instrument landing system approach to Chicago Municipal Airport. An emergency pull-up was made, and the flight continued to Indianapolis where it made a normal landing. There was no damage to the aircraft or injury to passengers.

Recent Two Rapid-Civil Aeronautics Board investigation found that the flight left the outer marker of the approach but at an altitude 200-600 ft. higher than required. In order to lose this excess altitude before passing the middle marker, a rapid descent (about 1300 ft. per minute at 150 mph) was initiated. The cause related to glide path indicators.

The pilot had been started during his descent when his altimeter stopped 150 ft. above the airport level, but the plane was still clearly below 300 ft. before the descent was actually checked.

Nearly two miles short of the airport, and before reaching the middle marker, the DC-65 struck the ground of two parallel roads about 145 ft. above the field elevation. The plane was 341 ft. below the ILS glide path.

Warnings Unheeded—CAA at the Chicago airport was monitoring the ILS approach and initiated calls to the

American DC-65 several times, stating that the plane was below the glide path. The pilot said that due to poor visibility he heard none of these warnings and was not even aware his approach was being radar monitored. The co-pilot stated he heard the first warning but was not sure for any action to be taken before the plane struck the power line.

Immediately after the incident, the ILS glide path and localizer were checked and found to be operating normally. The DC-65 altimeter was well within tolerance. ILS equipment at the time was functioning normally except for one defective tube in the glide path receiver which caused later technical inspection of the receiver but not erroneous readings.

Obviously, the warning was based on the flight crew's failure to maintain sufficient altitude to clear obstructions during an instrument approach.

New Orleans Case—Just two weeks before that incident, a Chicago & Southern Air Lines DC-4 making an ILS approach to Moment Airport, New Orleans, struck a tree and continued on to a normal landing although the crash was considerably damaged. There is no CAA indication at New Orleans to account for ILS approaches.

CAA and the FAA agreed conclusively that the ILS receiver on the DC-4 was out of calibration and that the co-pilot indicated that he got no indication warning to the pilot that the plane was below the glide path. While other CAA pilots subsequently reported difficulty with the glide path while working scheduled ILS approaches, terms were made as three of the company's planes (a DC-4 and two DC-61).

It was found that the ILS receiver in all three planes were properly calibrated.

ATA Makes Study—With these incidents emphasizing the value of radar-monitored ILS approaches, the Air Transport Association is trying to determine the best method of providing pilots with GCA advisory or emergency information. It is considering three procedures.

• CCA advisory and emergency information to be transmitted over the ILS localizer voice frequency, with the pilot monitoring this frequency released

from the center marker. CAA would provide the tower controller with an "override" feature on the CCA frequency so that warning could be given if needed.

• CCA advisory information to be transmitted over the ILS voice channel. CCA emergency information going over the approach control frequency, with the pilot monitoring for approach control frequency, and CCA providing an "override" feature for CCA on the approach control frequency.

• Both CCA advisory and emergency information to be transmitted over the approach control frequency, with both pilots monitoring the approach control frequency.

First Method Favored—ATA favors the first of these three methods as the most accurate and reliable. Transition from one consistently or advisory type of CCA information to an emergency transmission is immediate as active and requires almost instantaneous reaction by the pilot. Further, methods of transmission of information in CCA advisory or emergency information might make necessary the transfer of an emergency transmission.

Second method was not considered desirable because advisory and emergency information would not be associated. The pilot monitoring the approach control frequency would not receive the advisory information, and his first warning would be the emergency transmission unless the advisory information was relayed by the other pilot.

Third method also is considered undesirable because if advisory information is transmitted over the approach control frequency, the approach control frequency must stop during the time the aircraft is released from the outer marker.

Puerto Rico Adopts New Nonsked Rules

Concerned over recent crashes involving non-scheduled airlines, the Puerto Rican government has incorporated Part 135 of the U.S. Civil Air Regulations into Puerto Rican transport operations, into its territory laws, and provided more severe penalties for violations of the safety rules than the Civil Aeronautics Administration can impose.

Victims of the Puerto Rico airlines are subject to a \$10,000 fine or two years in prison, or both. Puerto Rico is also requiring airport operations to be with the territorial Transportation Authority subject of all revenue passengers carried on passengers. The Transportation Authority is empowered to notify passengers of the results of an audit and crew inspection and to advise whether insurance is possible.



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- **SEBIE TROPHY RACE**—195-mile closed course classic for high speed planes. Sunday.
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der, but late last month the U. S. Coast Guard of Augusta for the District of Columbia denied the petition filed by the company.

Stratford held the claim that it would suffer "reasonable" damage if forced to cease operations in association with CAA's order. CAA stated that Stratford would be less severely affected than the carrier already had made arrangements for leaving its equipment to other non-scheduled lines.

• **Leasing.** Agreements-On file with CAA are proposed leasing agreements. Stratford has negotiated with Trans National Airlines, Long Beach, Calif., and Associated Airways, Inc., Burbank, Calif.

KAL, said it has no stock interest in Trans National or Associated.

It is expected, however, that CAA will continue to keep a close eye on Stratford. The Board in the past has had considerable experience with new decks which eventually go out of business but actually turn up operating under another name with the same personnel and equipment.

• **Profile Rejected.**—Disputed at Federal Air Express early in 1946, Stratford operated almost daily intracoastal flights during much of 1946 and early 1949, according to CAA records. SAE's check to court file was 9/9, completed with 5117 AS as the certified air line, and the company has shown substantial operating profits.

The line at first used DC-3s and later had later operated C-46 and DC-4 equipment. Stratford was estimated to have 200 intracoastal flights during its three years of operation. With only 57 employees, it handled over 5000 passengers during one three-month period last year.

Stratford's president is Stanley Weiss, an Air Transport Command pilot in World War II. Vice President James Fredrickson was chairman of the National Independent Air Carriers and had that association's sponsored fight against CAA's arrest of crashdunks on non-scheduled operators.

• **Crash Inquiries.**—A week before it stopped operations, Stratford had its last fatal accident. A C-46 crashed near Chatsworth, Calif., killing 15 of the 48 occupants. CAA hearing on the accident was to be held in Santa Monica, Calif., last week.

With Stratford grounded, CAA will place its intracoastal routes again under other non-scheduled operators on the transcontinental and New York-Puerto Rico routes which are also charged with conducting flight school service. These companies include Airline Transport Carriers, Burbank, Calif.; Viking Air Lines, Burbank; and American Air Transport (Miami Springs, Fla.

StratoCruisers Go On Domestic Runs

Northwest Airlines plans to inaugurate the first scheduled domestic service with Boeing StratoCruisers this week with flights between the Twin Cities and Chicago.

Transcontinental StratoCruiser flights between New York and Seattle will be established by Sept. 1, according to R. O. Belknap, NWA's vice president. Detroit, Milwaukee, San Francisco and Spokane will also be served on the coast-to-coast schedule.

Scheduled rates will be charged for NWA's regular StratoCruiser accommodations. Bertha from New York to Seattle will be 50¢ (plus tax) extra.

Committee Studies Fuel Concessions

Arguments between the airlines and airport operators over the granting of exclusive concessions to airports for foreign services, recently submitted by Civil Aeronautics Administration, are being considered by the Senate's Interstate and Foreign Commerce Committee.

Last week, the committee held below it.

• **An analysis by Eastern Air Lines** showing that exclusive fuel concessions at airports would add 566 million to the scheduled airlines' annual operating costs or about 16 percent of their 1949 income for last year. The deduction was based on the assumption that if airlines are required to purchase their fuel on an airport-to-airport basis, they will no longer enjoy the cut rates they now obtain from suppliers through contracts covering their whole system.

• **A committee estimate by CAA Administrator D. W. Renshaw** that the exclusive fuel concessions plan of airports will cost the airlines "more than \$10 million" an

month. Renshaw based his claim on the assumption that airport concessions will allow rebates by bulk purchase to supply all airport users. Renshaw is now preparing a detailed rebuttal of the I.A.I. analysis for study by the Senate committee.

CAA issued an order on May 10 per requiring airport operators to grant to charter jet concessions. Airport operators and airlines have been wrangling over the issue for over four years.

New Mail Rate Proposed for TWA

TWA, which has edged into the black during 1949, should soon be able to wipe out some large deficits from past years.

The carrier has been offered about 57 million additional temporary mail pay for services over its trans-Atlantic route between Feb. 5, 1946, when it first opened the line, and Dec. 31, 1947.

• **Offered at TWA.**—Under the new mail rate, TWA would receive \$9,718,890 (50¢ per plane mile) for the 23 months period ending 5/31/47—100 (179 cents a plane mile). TWA lost \$4,669,980 on its intracoastal operation between Feb. 5, 1946, and the end of 1948 under its former temporary mail rates.

Since deficits on TWA's domestic service during 1948-49 were also substantial, the stockholders' equity in the company's combined operations was reduced to \$8,449,000 from \$18,449,000. In view of this situation, CAA has offered the carrier the 57 million increase to strengthen its position pending completion of a final rate case.

• **Police Clarified.**—The Board in its 1948 decision made clear that if no longer applies an airline to prove that its intracoastal foreign position is critical before it can obtain higher rates.



MID-WEST GETS FIRST 190

First airline to use single-engine equipped Douglas C-47s, Mid-West plans to replace scheduled passenger and mail service this initial delivery of Cessna 190 single-engine planes to be used. Shows with

plans are B. C. Anderson, Mid-West president; Harold Miller, with George Tatro, Don Morgan, Rogers-Wilkinson and James J. Ramsey, National director of aeronautics.

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GENERAL ELECTRIC

pany could pay to replace an existing one.

"We no longer feel we should wait for a financial crisis," CAB said. "Before we think the temporary rate device may appropriately be employed not only to alleviate an existing financial crisis but also to forestall the creation of such a crisis."

The new temporary rate sets of 80.6 cents a plane mile proposed for TWA is considerably higher than the first rates offered at competition—Pan American Airways and American Overseas Airlines—for 1946 and 1947. ACA would receive 55.1 cents a plane mile and PAA 72.4 cents a plane mile.

Braniff Brings Claim Against Mexico

E. K. Braniff, president of Braniff Airways, has asked the U. S. State Dept. to protest a claim for at least \$1,250,000 by the Mexican government for loss of financial investments in the cancellation of flying permits of American Route 8, S. A.

Braniff's recourse to top-level diplomatic channels comes following a ruling against the Dallas-based airline early last month by the Mexican supreme court. Braniff has sought to obtain redress through Mexico's courts since creation of the air service in October, 1946.

• **Rescues PAA Deal**—The claim increases personally charged that Braniff was bought in return says by Congressmen Mexican De Avila, S. A., subsidiary of Pan American Airways. Originally, Braniff's Mexican link was planned as part of its Latin America service which has now been extended to Rio De Janeiro and Lima via El Estero and Panama.

"The Braniff case" assumes current importance in view of Mexican government and private efforts to obtain financing in this country for industrial development in Mexico.

Nonskeds Outstrip Regulars at Oakland

During June, for the second consecutive month, unscheduled nonsked operators handled more passenger traffic at Oakland, Calif. Municipal Airport than the scheduled airlines.

Part of Oakland statistics show that the unscheduled flew 11,789 passengers in June, compared with 11,123 for the scheduled airlines. In May, unscheduled operators carried 11,039 passengers against 10,699 for the scheduled airlines—United, TWA, Western, American and Southwest.

The unscheduled's June traffic increased 6.5 percent over May, while the scheduled airlines' passenger busi-

ness at Oakland was up about 2 percent.

• **Six-Months Gain**—Scheduled airlines handled 15,931 passengers at Oakland during the first six months of 1946, compared with 51,443 in the first half of 1945—an increase of 72.6 percent. Unscheduled lines in first half 1946 handled 16,492 passengers at Oakland—a 236 percent gain over the 13,876 who were carried in the first six months of 1945.

Port of Oakland and the Oakland chamber of commerce have been at odds with the continued increase in scheduled flights over Oakland, forcing sessions of that city to board planes at San Francisco Municipal Airport.

Australia-India Tie

(McGraw Hill World News)

MELBOURNE—Recent conclusion of an air transport agreement between Australia and India may indicate a policy change on the operation of flights as services in Australian territory.

Indian government airline is authorized stage at Darwin and Sydney. Since the pact with Pakistan, the agreement has a "preference" clause designed to prevent economic competition between the airlines of the two countries.

Australia's Department of Civil Aviation is still hedging in an agreement with Air Ceylon. Applications by Air France and KLM are also still hanging fire.

Pan American Airways, the only American carrier permitted to land in Australia, has requested permission to make Melbourne the scheduled point, but Australian government has refused to grant it.

Australia's policy has been to give landing rights only to foreign government airlines, and to exclude all foreign airlines from revenue-carrying operations in the Commonwealth.

Empire Certificate Extended 15 Months

Empire Air Lines, Inc., Ltd., has been given a 15-month extension of its temporary feeder certificate.

"The franchise had been due to expire Sept. 27, 1949, three years from the date Empire started service. But the Civil Aeronautics Board decided the carrier had shown sufficient progress to warrant extension of the franchise to Dec. 31, 1950.

• **Traffic Generation**—A recognition of Empire's air sales certified by the board shows it has made marked penetration of the traffic over its 700-mile system, and its operating costs have been in line with other short-haul carriers, CAB declared. In 1946, Em-

pire generated 75.6 passengers per 1000 population served, against 44.3 for West Coast Airlines, 54.2 for Frontier, 35.9 for Mohawk, 29.9 for Challenge, 39.3 for Southwest and 31.2 for Trans World.

The 15-month extension will provide CAB with more data to weigh Empire's progress since it switched routes from SFO to DC in late March, 1948.

TWA Hits 20

A 20 mph Ford 1½-Motor limbered through a 13-day touch and go flight from Los Angeles to New York late last month, marking the 20th anniversary of coast-to-coast service by Trans World Airline.

The craft, rented by TWA for the occasion, was flown by aviator Clint Johnson and Jack Kennedy. The Ford made 19 stops on its way to New York, each one at a TWA service city. It flew the last leg of the flight—from Philadelphia to New York—in 1 hr. 20 min.

The Ford at LaGuardia Field to meet the "Tin Goose" were Western Union men, board observers, and 25 crew members of TWA. It was reportedly the first time a Ford Tin-Motor had ever landed at the seven-year-old field.

SHORTLINES

• **As Financiers**—Had 100 percent paid-off fraction on its scheduled trans-Atlantic flights during July, with only scattered units available through August and September. — Company has so issued in Constitution rights to Invest Air Inc.

• **As Law Firms**—MFA execs try hard at a recent visitation in Chicago announced, outlined pending legislation in the House and Senate which would restate the independent Air Safety Board. (President Cleveland J. Schaefer cited the "more serious flight problems of Boeing Stearman" as the most recent of many reasons for passage of the legislation at the earliest possible time.)

• **American-Flag**—declared the regular quarterly dividend of \$7.1 cents a share on the corporation's \$150 cumulative convertible preferred stock, payable Sept. 1.

• **Alaska**—The Columbia carrier's 1946 annual report showed the company lost \$12,496 passengers last year, an increase of 66 percent over 1947, and had a net profit of \$740,495. The line operates scheduled service on over 60 points on Columbia and flies to Panama, Ecuador and the U. S. An affiliate, Aerolineas Libanese, runs a fleet of Cessna 370s for service to small fields in remote regions.

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► **Children: Legislature**—The again delayed attempt to bring interstate airline operations under control of the State Public Utilities Commission last week was rejected, a resolution along the Civil Aeronautics Board to require all airlines to meet the same safety standards.

► **Control Air Lines**—The unaffiliated operators have received a special CAB commission to make a nonstop DC-4 flight between Newark and Port of Spain, Trinidad, and members of the American Field Service, a nonprofit organization of wartime volunteers.

► **Eastern—Reports** of scheduled route plans make weekly then any other domestic airline.

► **Northwest—Cargo** loads on NWA flights to Hong Kong varied during the four-day strike in the island.

► **Pan American—Has** asked CAB permission to serve New France in a co-terminal with Montreal.

► **Panair—CAB** says that the freighter's mail rate because PANA's aircraft have been higher and its expense lower than expected when the firm established a new route last December.

► **Southern—Has** requested approval from Zurich to Bogota, Yugoslavia. The flight constitutes the only direct link between Yugoslavia and western Europe.

► **TWA—Time** involved in setup overhead at the company's DC-4s at the Kansas City base has been cut from 5900 work-hours every month ago to 2800 now hours as the result of an improved work sequence plan which permits average of 5100 hours monthly.

► **United—Has** had a 120 percent completion factor for its DC-6s since the start of San Francisco Honolulu service about two years ago.

CAB SCHEDULE

Aug. 5—Flying on arrival of Southwest's 747-100 aircraft and departure of United Air Lines service at the West Coast route (Chicago 220 and 190).

Aug. 6—Departure on arrival of air freight mail service (Chicago 220 and 190).

Aug. 7—Departure on arrival of air freight mail service (Chicago 220 and 190).

Aug. 8—Departure on arrival of air freight mail service (Chicago 220 and 190).

Aug. 9—Departure on arrival of air freight mail service (Chicago 220 and 190).

Aug. 10—Departure on arrival of air freight mail service (Chicago 220 and 190).

Aug. 11—Departure on arrival of air freight mail service (Chicago 220 and 190).

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Aug. 14—Departure on arrival of air freight mail service (Chicago 220 and 190).

Aug. 15—Departure on arrival of air freight mail service (Chicago 220 and 190).

Aug. 16—Departure on arrival of air freight mail service (Chicago 220 and 190).

Aug. 17—Departure on arrival of air freight mail service (Chicago 220 and 190).

Aug. 18—Departure on arrival of air freight mail service (Chicago 220 and 190).

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EDITORIAL

Sen. Johnson's Sound Appraisal

Broad outline of the program Congress may propose to strengthen the airlines has been avoided by Sen. Edwin C. Johnson, whose Interstate and Foreign Commerce Committee is investigating industry finances.

Speaking at Kansas City during TWA's 20th anniversary celebration, Johnson came out fairly far apart from of unmet promises from industry. He urged more consolidation of ground services, additional equipment interchange agreements and thorough exploration of the possibilities of air coach.

The address was temperate, unprejudiced, and discriminating in its analysis of air transport problems. The senator apparently has been able to discuss basic problems despite the marifolous muddling of the record by a minority of intraparty and intraparty (airline) presented on both the scheduled and non-scheduled sides.

Sen. Johnson believes air transportation "is essential to become the most attractive and economic transportation in history. . . . I still look for a tremendous increase in air traffic volume."

The speaker said: "It is clear that Congress as well as the Civil Aeronautics Board may have to consider means to induce airlines to transfer routes and to merge or consolidate on reasonable terms and in the best interests of the public."

He urged air management to consider carefully all usage possibilities.

"Great credit is due the airlines for the speed with which they moved their field and air far coast" during the hard times of postwar. "Nevertheless, they have not gone as far, nor as fast, as the economic pressure demands."

Turning to airline financing, Johnson asserted some carriers had adapted adverse policies. He criticized operators who have not maintained a reasonable ratio between debt and equity financing.

He said he was reluctant to advocate further encouragement by government on the domain of business management's financial freedom. "But the unpleasant facts dictated by our inquiry came out to favor the suggestion of CAB control over security issues," he said.

The chairman emphasized that his statements did not necessarily reflect the thinking or judgment of the Interstate and Foreign Commerce Committee. It is expected, however, that the committee majority views will not vary substantially from Johnson's.

Although the airlines are not yet out of the woods, 1949 has been a turning point in the industry's fortunes, Johnson declared. "Fixed charges and operating expenses have declined slightly . . . regularly is better, safety has made tremendous gains, and traffic is up. Hope and faith have returned, and clarity is on its way out."

Johnson indicated belief that the airlines have tried only halfheartedly to consolidate their airport operations " . . . a more aggressive approach toward consolidated operations would produce savings without service to service. If CAB classified some of the less-well lightening operations as legitimate expenses in determining mail pay we would have a very different story."

He took notice of CAB delays in major costs, and the applicant's expense and time required, which "can lead the wrong errors into financial ruin." Each of the four major applicants in the air freight case had testified that his costs so far had been from \$70,000 to \$100,000 to pursue certificate efforts. "I wonder how much the A. T. A. and the certificate carriers have spent in opposing them?"

Johnson spoke favorably of the first-of-the-week family fare plan and special excursion rates. But "no one will deny that of these three, or each has had the most spectacular effect on development of rail mass air transportation."

The senator took issue with the position taken by some airline officials before his committee that there is nothing wrong with the industry that bigger and better mail pay won't cure. He noted that total mail pay (domestic and international) jumped from \$42,957,000 in 1946 to \$68,490,000 in 1947, \$111,511,000 in 1948, and an estimated \$121,000,000 in 1949.

He and Congress should decide whether the airlines are to be a regulated public utility or live under the law of the market of the street. "Today airlines are neither best nor worst and therefore receive support from the public treasury to insure competition."

"I find less self-interest competition everywhere—shown by excessive scheduling, luxurious passenger rates, and extravagant promotional advertising of all kinds. To me, excessive competition purchased with federal funds is ridiculous."

Either the industry must submit to full government regulation with less competition or run the risk of financial failure resulting from its own mistakes. At the same time a way must be found to provide adequate air service to local and intermediate cities that will benefit and can reasonably support air service.

The senator asserted that in the postwar years there have been "plenty of profitable enterprises" of the airlines, CAB, and Congress.

It is not, indeed, that a member of Congress has given evidence of such a grasp of the problems of air transportation, and such an understanding to permit his judgment to be swayed by the happy but transient thunderings of the propaganda. If the entire committee display the qualities of the chairman in its recommendations, the industry should see hope of sound legislation on Capitol Hill.

ROBERT H. WOOD



Mr. Edward T. Bolton, Vice-President in Charge of Operations, Philippine Air Lines

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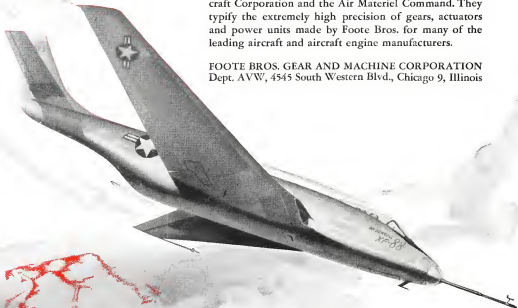
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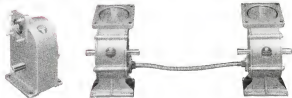
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